

## ABSTRACT

In the first circuit arrangement, a low noise balanced microwave amplifier includes an input coupler having an integrated noise-matching circuit, a single-ended amplifier in each branches, and an output coupler. The impedance at each output port of the input coupler is set close or equal to the optimum noise source impedance of an active gain device in the single-ended. No additional circuit element or only one shunt inductor or capacitor is needed for the noise matching. The total insertion loss of the input network is reduced to improve the overall noise figure. In the second circuit arrangement, two low noise amplifiers of microwave monolithic integrated circuit (MMIC) are used for the active gain device within the balanced amplifier. The MMIC are matched close to or equal to the optimum noise source impedance at the input of the MMIC and to the optimum intermodulation impedance at the output rather than the nominal characteristic impedance of the MMIC such as 50-Ohm to improve the noise figure and intermodulation performance.